

## Case Reports

# Polycystic Kidney Disease Associated With Unilateral Lameness in a Northern Pintail (*Anas acuta*)

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**Abstract:** A captive 10-year-old female northern pintail (*Anas acuta*) with a history of unilateral lameness was diagnosed at necropsy with polycystic disease most severely affecting the right kidney. The lameness was attributed to pressure on the sacral nerve plexus caused by the unusually large cyst arising from the right kidney. Polycystic kidney disease previously has been considered an incidental finding in avian species and has only been reported in a pigeon. The clinical significance of polycystic kidney disease in this pintail was attributed to the mechanical pressure caused by the cyst rather than renal dysfunction.

**Key words:** polycystic disease, kidney disease, lameness, sacral nerve plexus, avian, northern pintail, *Anas acuta*

## Introduction

Polycystic kidney disease is the disruption of renal parenchyma by cysts of various sizes. In birds, this condition is rarely of clinical significance.<sup>1</sup> However, large, fluid-filled cysts can exert excessive pressure on adjacent structures.

Unilateral lameness and abdominal distention are common findings in birds with renal neoplasia, egg binding, ectopic eggs, hepatic disease, or other intracoelomic neoplasia.<sup>2,3</sup> To reach a definitive diagnosis, imaging studies and additional diagnostics are necessary but may not be conclusive.<sup>4,5</sup>

In this report we describe polycystic kidney disease in a northern pintail (*Anas acuta*) and its suspected association with unilateral lameness.

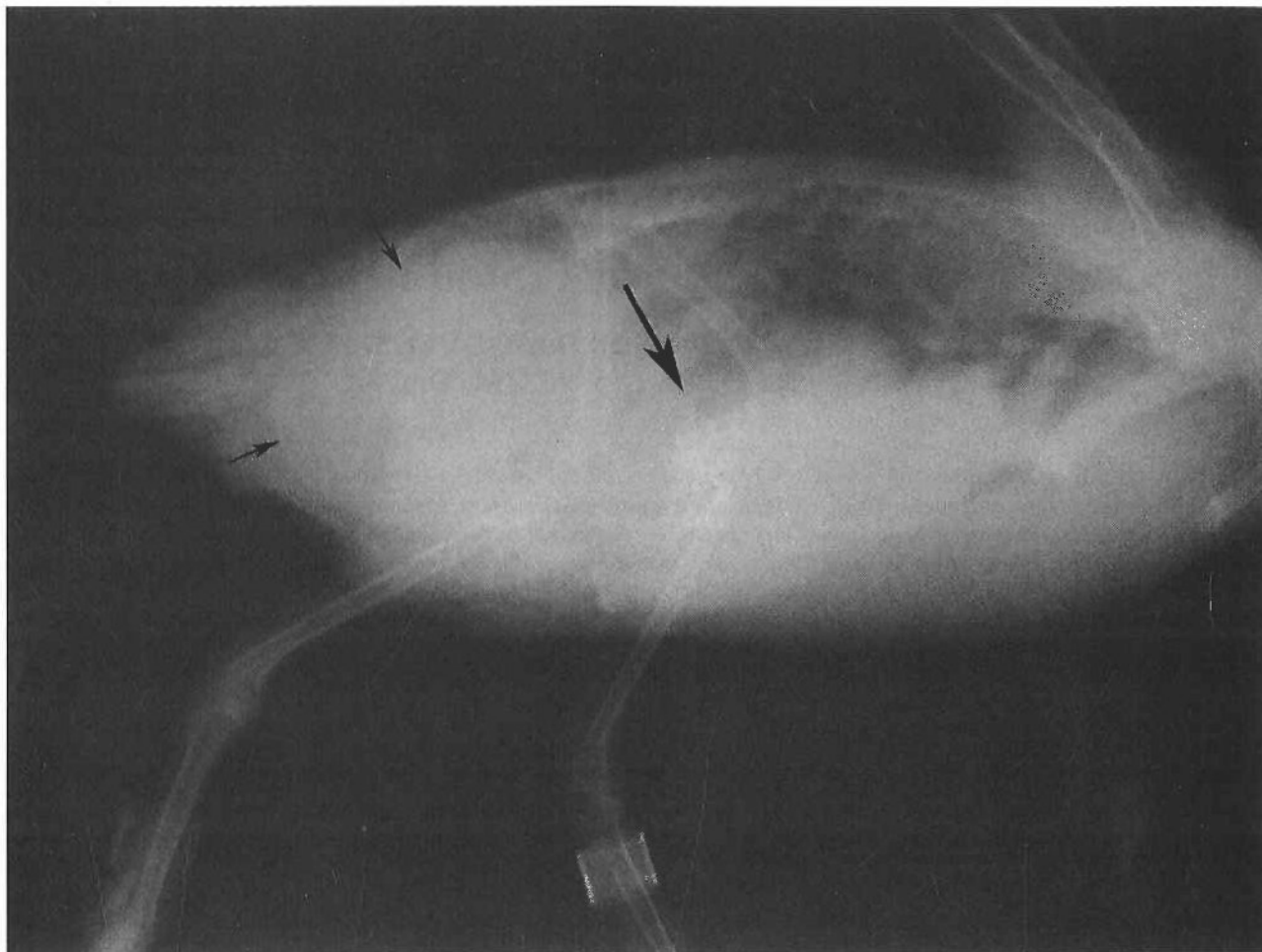
## Case Report

A 10-year-old female northern pintail weighing 780 g was evaluated for right-leg lameness of 2 days duration. The bird was housed with conspecifics in a semiopen aviary and had no previous medical problems. When observed while standing

still, the bird appeared normal. It was bright, alert, and aware of its surroundings and displayed no neurologic deficits. However, distinct right-leg lameness was observed when the bird walked. On physical examination performed under manual restraint, the bird was in good body condition, and no fractures or joint abnormalities involving legs or wings were apparent. Palpation revealed a firm, distended abdomen and no other abnormalities. A neurologic examination confirmed a bilateral menace response, and no head tilt, ataxia, nystagmus, or peripheral neurologic abnormalities were observed. Sensation was perceived to be normal in both limbs.

A blood sample was collected, and results of a complete blood count (CBC) and plasma biochemical analysis were unremarkable as compared with in-house reference values for this species (white blood cells = 15 700 cells/ $\mu$ l; hematocrit = 43%, total protein = 3.6 g/dl, uric acid = 8.4 mg/dl, and phosphorus = 3.8 mg/dl) (Department of Pathology, Smithsonian National Zoological Park, Washington, DC, unpublished data, November 2000). The bird was anesthetized to obtain survey radiographs. General anesthesia was induced with ketamine hydrochloride (20 mg/kg IM) and maintained with isoflurane delivered by endotracheal tube. Whole-body survey radiographs revealed a round mass with increased radiopacity occupying most of the caudal coelomic cavity and displacing the ventriculus cranially.

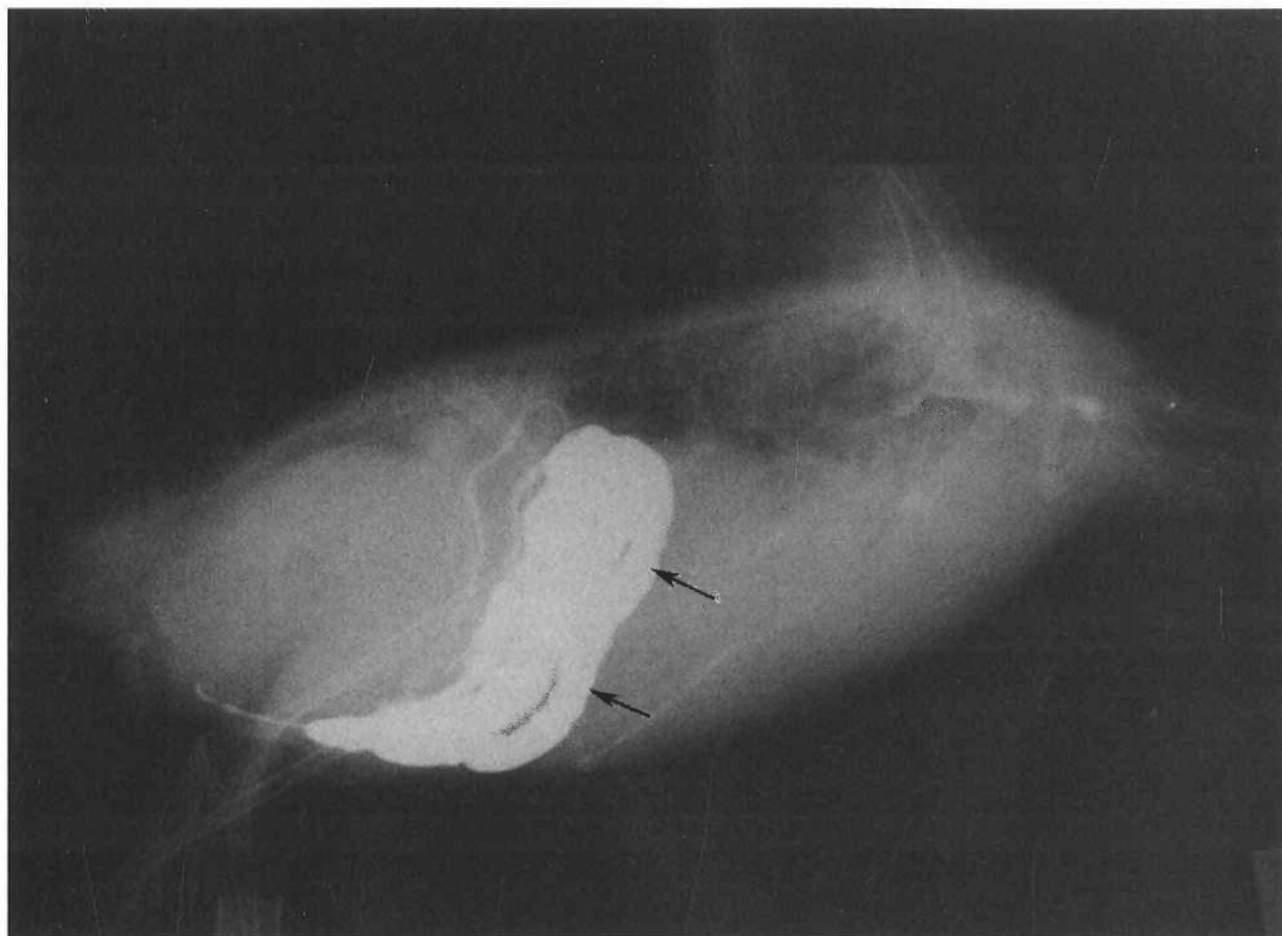
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**Figure 1.** Lateral survey radiograph of a northern pintail showing a round mass of increased radiopacity in the caudal aspect of the coelomic cavity (outlined by small arrows). Notice the cranial displacement of the ventriculus (large arrow).

nially (Fig 1). The normal radiolucent area created by the air sacs in the lateral view was absent. The origin of the mass was not apparent based on survey radiographs alone, and a gastrointestinal contrast series was performed to provide additional information. Barium sulfate (15 ml/kg of a barium sulfate suspension diluted 1:2 with water) was administered by gavage tube. Radiographs were taken at 10, 30, 45, 60, 90, and 120 minutes after barium administration. The contrast study partially outlined a well-circumscribed mass with increased soft tissue radiopacity in the caudal coelomic cavity and accumulated rapidly in a cranially displaced intestinal tract (Fig 2). Once the barium reached the cloaca approximately 1 hour after administration, gastrointestinal involvement with the mass was not suspected (Fig 3). The differential diagnosis at this time included an ovarian cyst, an ectopic egg, neoplasia, and cystic kidney disease.

When examined 10 days later, the bird showed no improvement despite treatment with ketoprofen (2 mg/kg SC q24h; Ketofen, Fort Dodge Animal Health, Overland Park, KS, USA). Results of a repeat CBC and plasma biochemical analysis remained within reference ranges. Ultrasound equipment was not available at the time for further diagnostic imaging, and exploratory celiotomy was elected. The bird was anesthetized by using the anesthetic protocol previously described. The skin was incised along the ventral abdominal midline, and muscles were bluntly dissected. Once the coelomic cavity was entered, a soft, white, spherical, fluid-filled mass was revealed to occupy most of the caudal coelom. Aspiration of the mass yielded 70 ml of opaque fluid, a sample of which was submitted for cytologic examination and both aerobic and anaerobic bacterial culture. Surgical resection of the mass was attempted by using a combination of



**Figure 2.** Lateral radiograph of the northern pintail described in Figure 1 at 10 minutes after administration of barium sulfate contrast material by gavage tube. A well-circumscribed mass with increased soft-tissue radiopacity is evident in the caudal coelomic cavity, and the intestinal tract is displaced cranially (arrows). The normal appearance of the contrast material in the intestinal tract suggests no intestinal involvement.

sharp dissection and electrosurgery. The mass was well attached to the dorsal aspect of the caudal coelomic wall, and significant hemorrhage occurred during dissection. The bird went into cardiorespiratory arrest, and efforts at resuscitation were unsuccessful. Cytologic examination of the fluid revealed a modified transudate consisting of few viable cells and foamy macrophages but no microorganisms. After 7 days, no bacteria were isolated on either aerobic or anaerobic cultures.

Necropsy revealed that intraoperative hemorrhage had originated from the right caudal renal portal vein. Marked right hydroureter also was observed. The right kidney had collapsed, presumably after fluid was aspirated during surgery, and only a thin rim of renal cortical tissue remained. An estimated 25% of the left renal parenchyma had cystic changes. Articular surfaces of the joints in both legs were carefully examined. All joints had full range

of motion, and no lesions were observed. No other significant macroscopic lesions were found.

Histologically, the right kidney contained multiple variably sized cysts lined with cuboidal epithelium that opened to the proximal convoluted tubules. Many of the cysts contained eosinophilic proteinaceous material (Fig 4). Extensive atrophy of the right renal cortical parenchyma was observed, with marked dilation of the collecting ducts giving rise to the hydroureter (Fig 5). No neoplastic cells were seen. Results of histologic examination of other tissues were unremarkable.

### Discussion

As is commonly reported with polycystic kidney disease, the diagnosis in this case was made at necropsy. Physical examination had revealed an enlarged abdomen, but the cause was not evident. Sur-

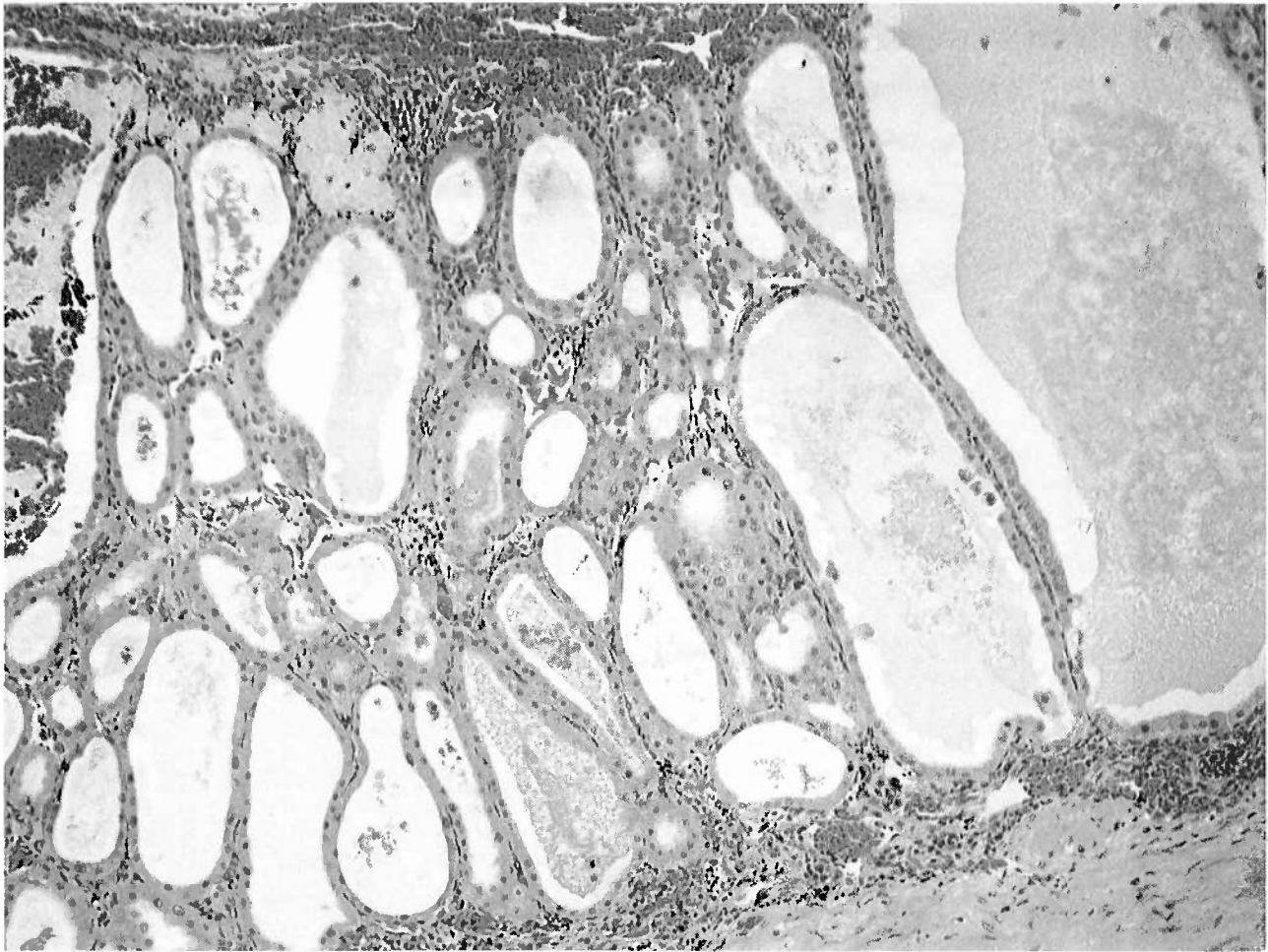


**Figure 3.** Ventrodorsal radiographic view of the northern pintail described in Figure 1 at 62 minutes after barium sulfate administration by gavage tube. Contrast material has reached the cloaca and partially outlines the intracoelomic mass.

vey and gastrointestinal contrast radiographs demonstrated a caudal coelomic mass external to the gastrointestinal tract, but differentiation between a mass of urogenital or reproductive tract origin was not possible. Evaluation by ultrasonography may have been beneficial, but appropriate equipment was not available at the time. Even at surgery and with the aid of cytologic examination of fluid as-

pirated from a large cystic mass, the origin of the mass could not be determined. The large size of the mass obscured the view of intracoelomic organs, and the low cellularity of the fluid hampered a cytologic diagnosis. The final diagnosis of polycystic kidney disease was made after necropsy and histologic evaluation of tissues.

Polycystic kidney disease is common in hu-



**Figure 4.** Photomicrograph of the right kidney from the pintail in Figure 1 showing segments of cystic proximal convoluted tubules containing proteinaceous material (hematoxylin and eosin,  $\times 250$ ).

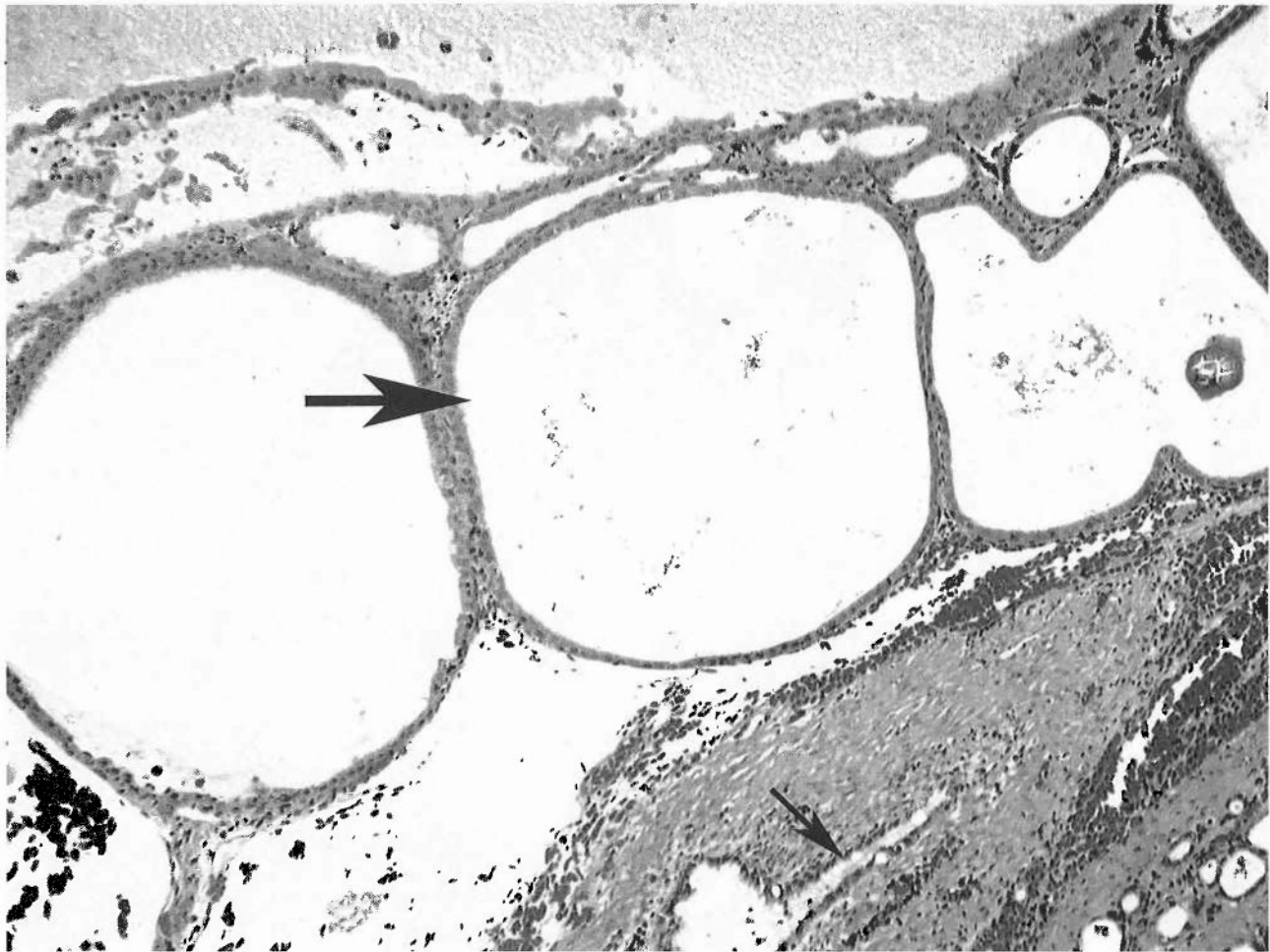
mans<sup>6,7</sup> and Persian cats<sup>8</sup> and has been found to have a genetic component.<sup>6,8-10</sup> In birds, polycystic kidney disease has only been reported as an incidental postmortem finding in a rock pigeon (*Columba livia*).<sup>11</sup> The few reports of polycystic kidney disease in birds may reflect a lack of its clinical significance in most individuals rather than an actual low prevalence. In fact, the most extensive review of renal pathology of fowl suggests that cystic kidneys are an incidental finding in cases of chronic nephritis.<sup>1</sup> In contrast to the disease recognized in other species, a familial expression has not been established in birds.<sup>1,11</sup>

In ducks, as in other birds, the sacral nerve plexus is completely embedded in the renal fossae. The ischiatic nerve that supplies the hind limb originates from this plexus.<sup>12</sup> Psittacine birds with renal neoplasia commonly exhibit lameness because of pressure on peripheral nerves in the region of the in-

volved kidney.<sup>3,13</sup> In this pintail, lesions involving the right kidney were most substantial. The right unilateral lameness was presumably attributed to pressure being applied to the ischiatic nerve by the unusually large cyst arising from the right kidney. The absence of other significant pathologic lesions radiographically and at necropsy as well as on histologic examination of tissues, including those from the central nervous system, supports this assessment. Severe renal dysfunction was not a significant clinical abnormality in this case, because no indication of such was observed on 2 consecutive biochemical analyses. The left kidney most likely retained adequate excretory function.

Although most cases of polycystic kidney disease may not be a clinically significant entity in birds, this condition, as well as any renal mass, should be considered in birds that exhibit abdominal enlargement with or without lameness.





**Figure 5.** Photomicrograph of the right kidney of the pintail described in Figure 1. Cystic tubular remnants (large arrow) are adjacent to a collecting duct (small arrow) (hematoxylin and eosin,  $\times 250$ ).

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